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(54) **LOCK FOR A DOOR OR DOOR WING**

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E05B 47/00 (2006.01)

E05B 63/00 (2006.01)

E05C 3/04 (2006.01)

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(57) **ABSTRACT**

(58) **Field of Classification Search**

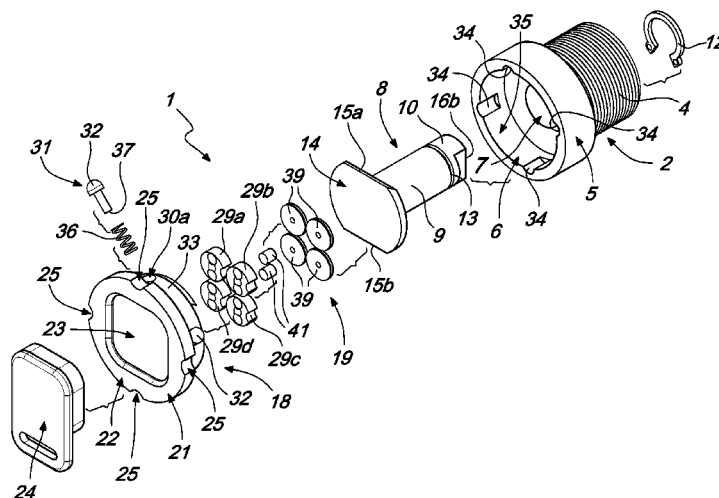
CPC E05B 47/0042; E05B 63/0065; E05B 47/0043; E05B 47/0045; E05B 47/0038; E05B 15/0073; E05B 15/14; E05C 3/042

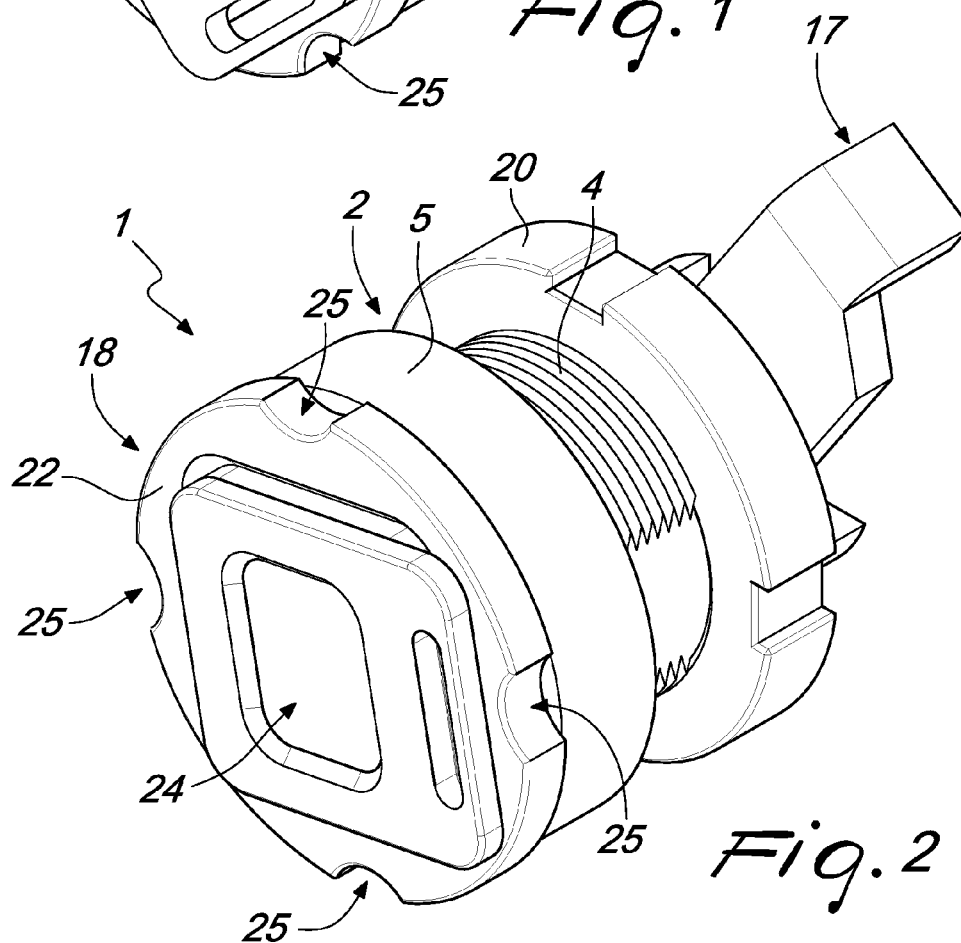
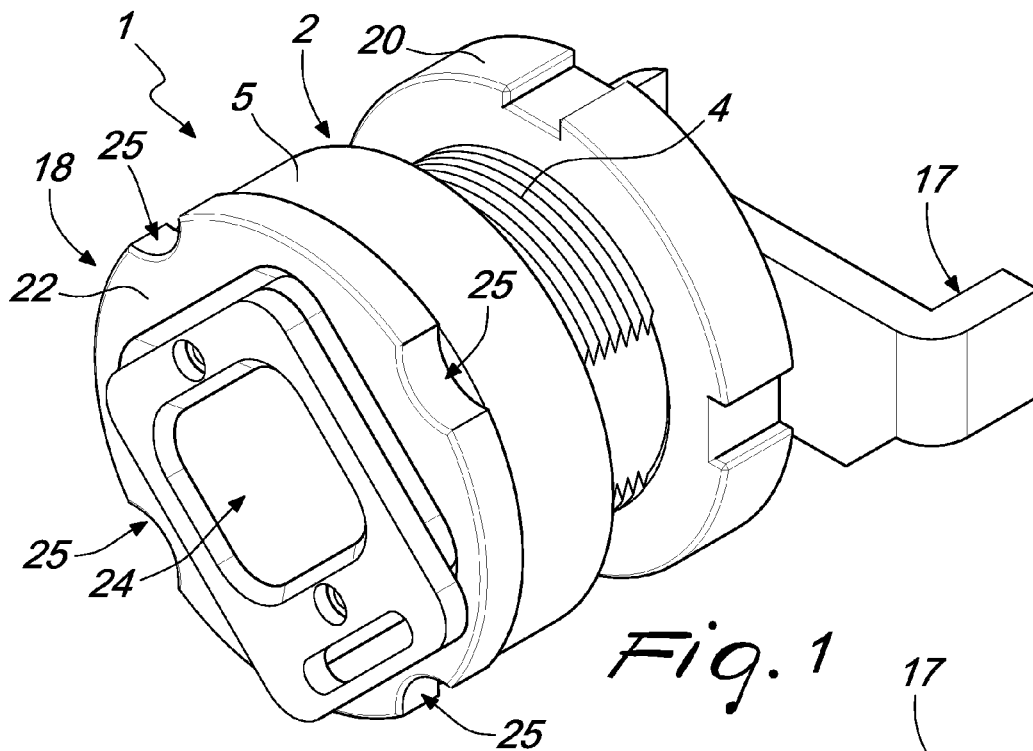
A lock includes a cylinder, fixed to a door or door wing, with which a pivot is associated coaxially and rotatably, a lever for closing the door or door wing to a jamb being keyed to the end of the pivot; a separate body can be keyed detachably to the head of the pivot and is provided with magnetic elements for the temporary locking of the rotation of the body with respect to the cylinder.

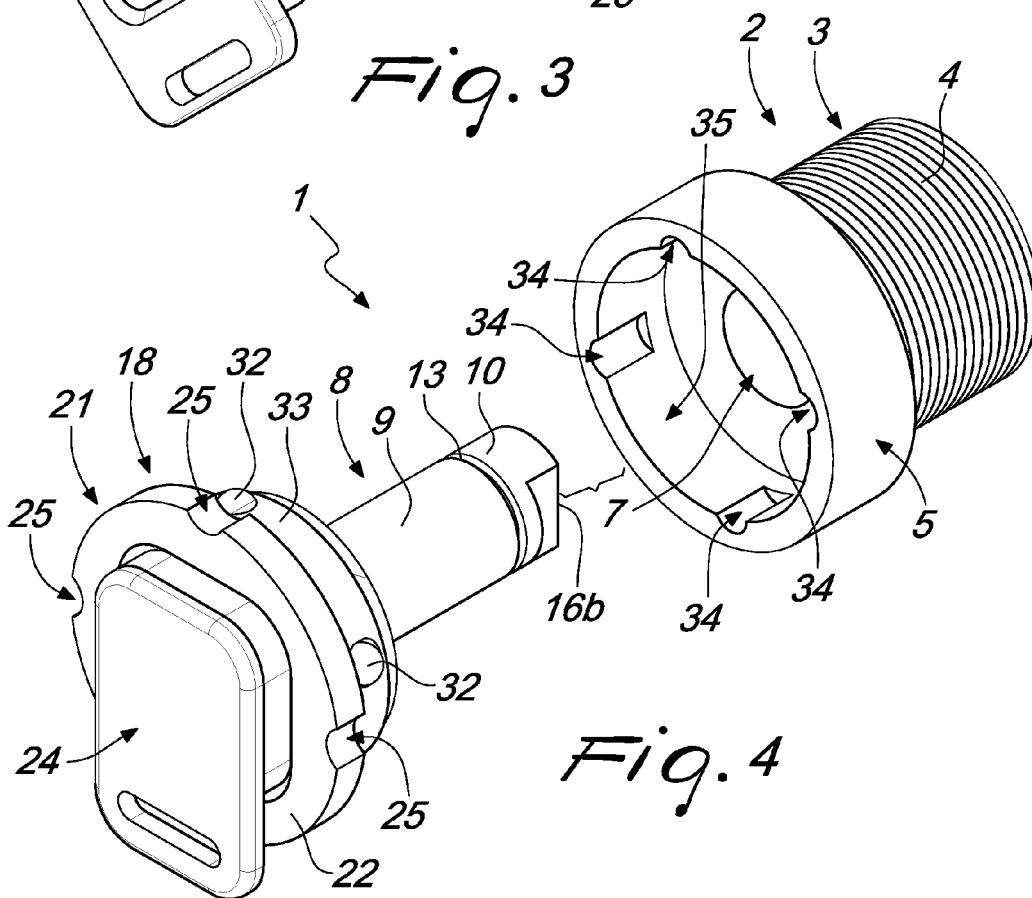
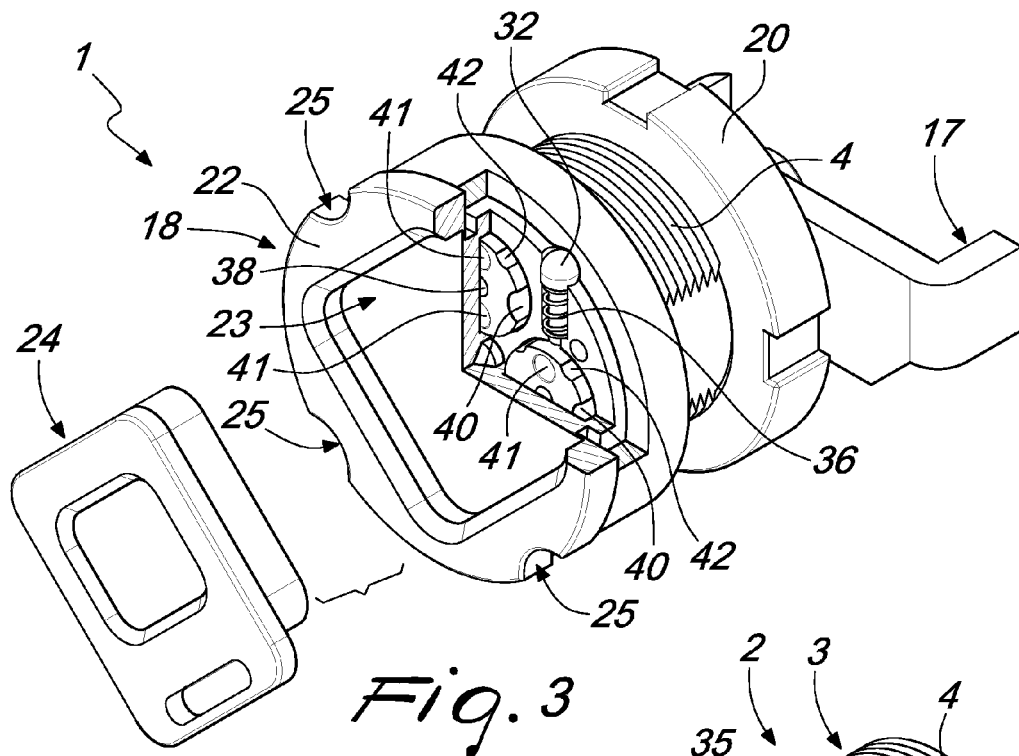
USPC 70/78, 79, 81, 135, 136, 139, 276, 413, 70/416, 417, 423, 427, 453, 454, 455, 344

See application file for complete search history.

13 Claims, 13 Drawing Sheets







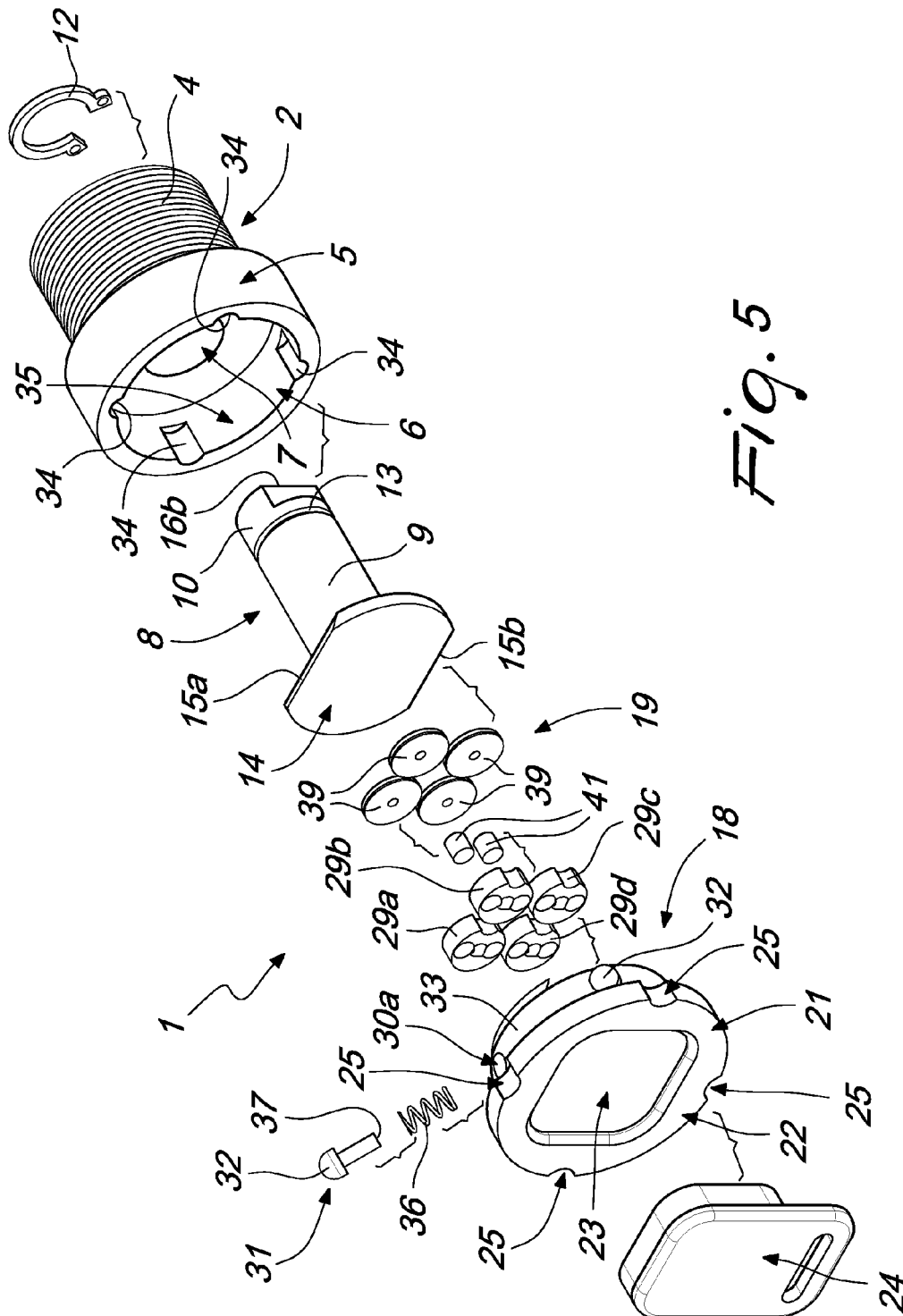


Fig. 5

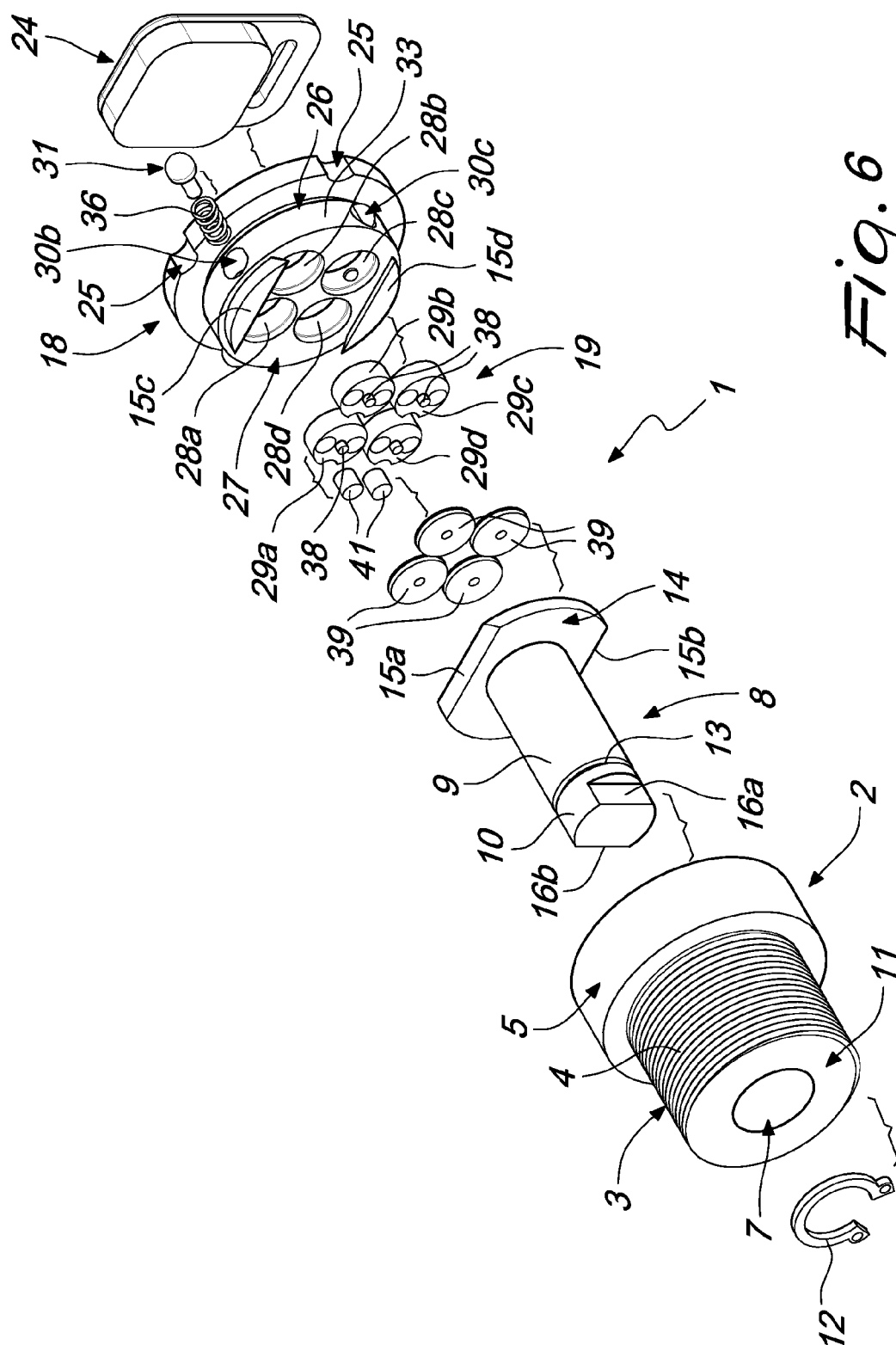
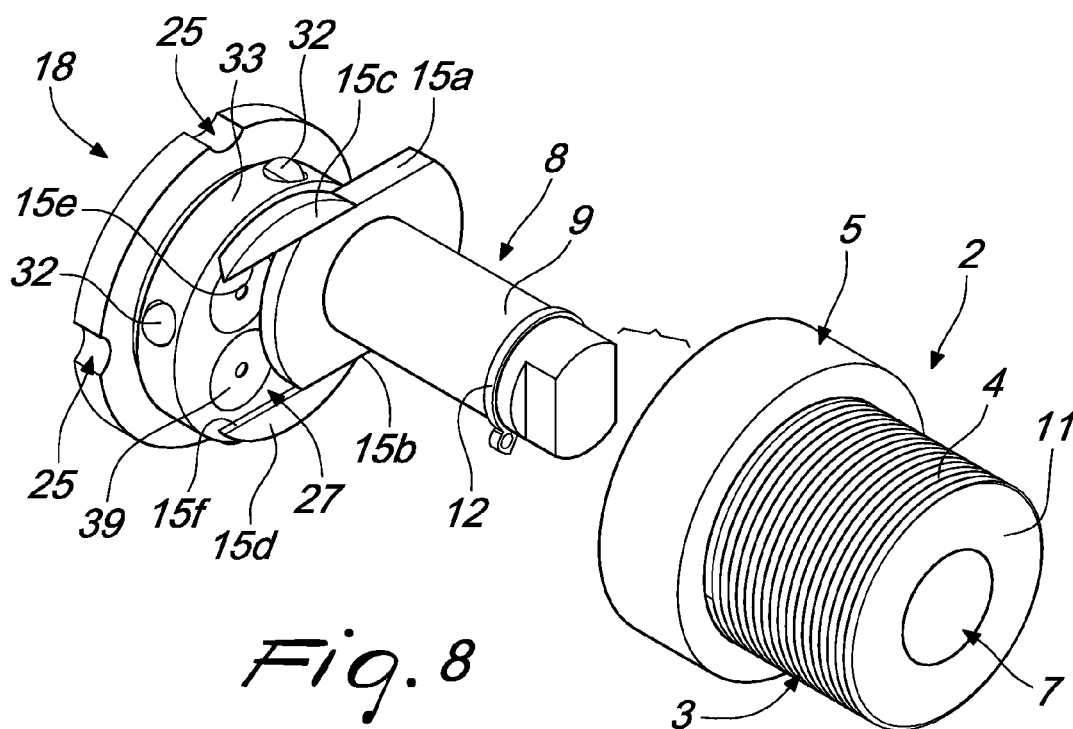
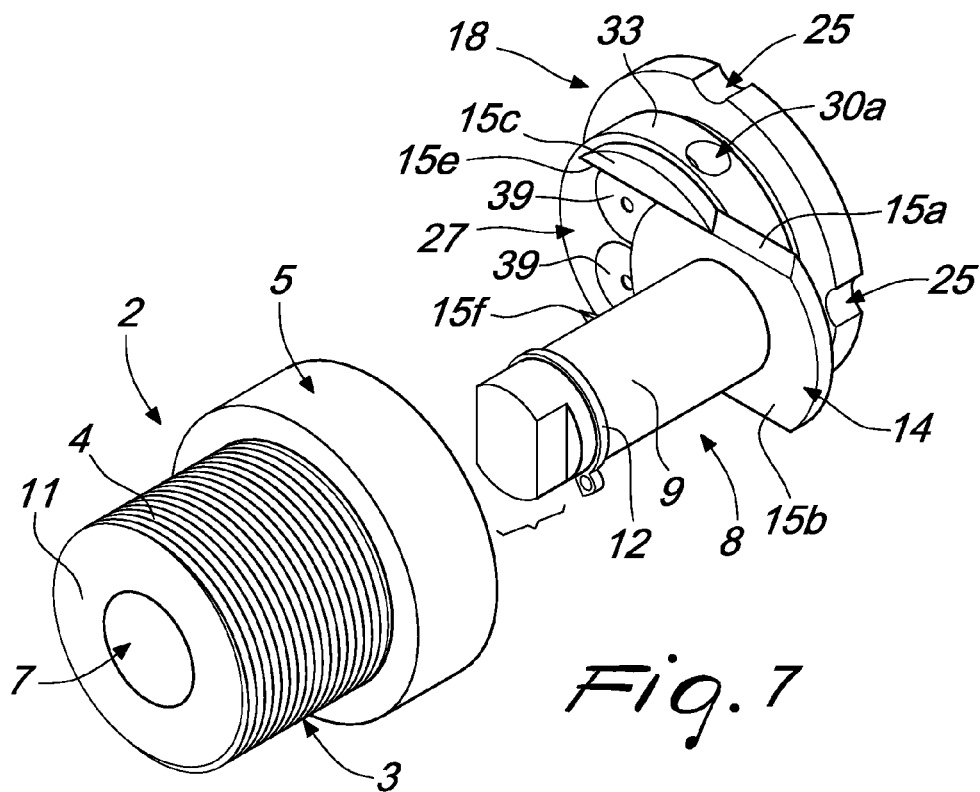
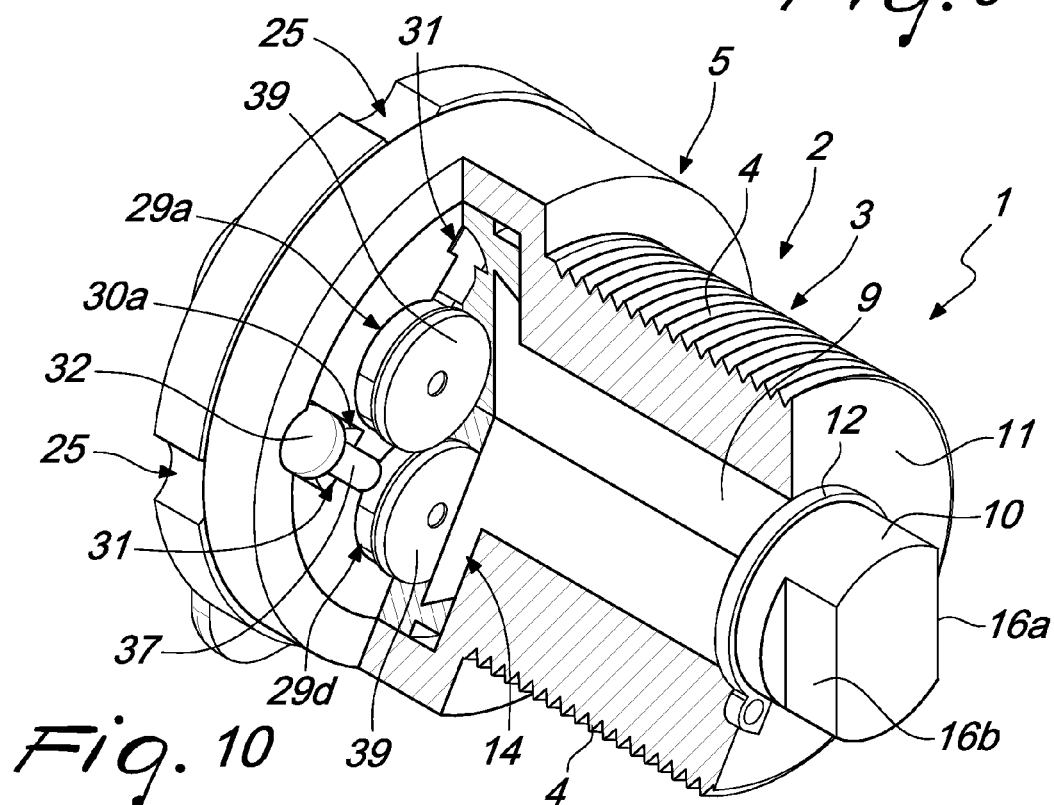
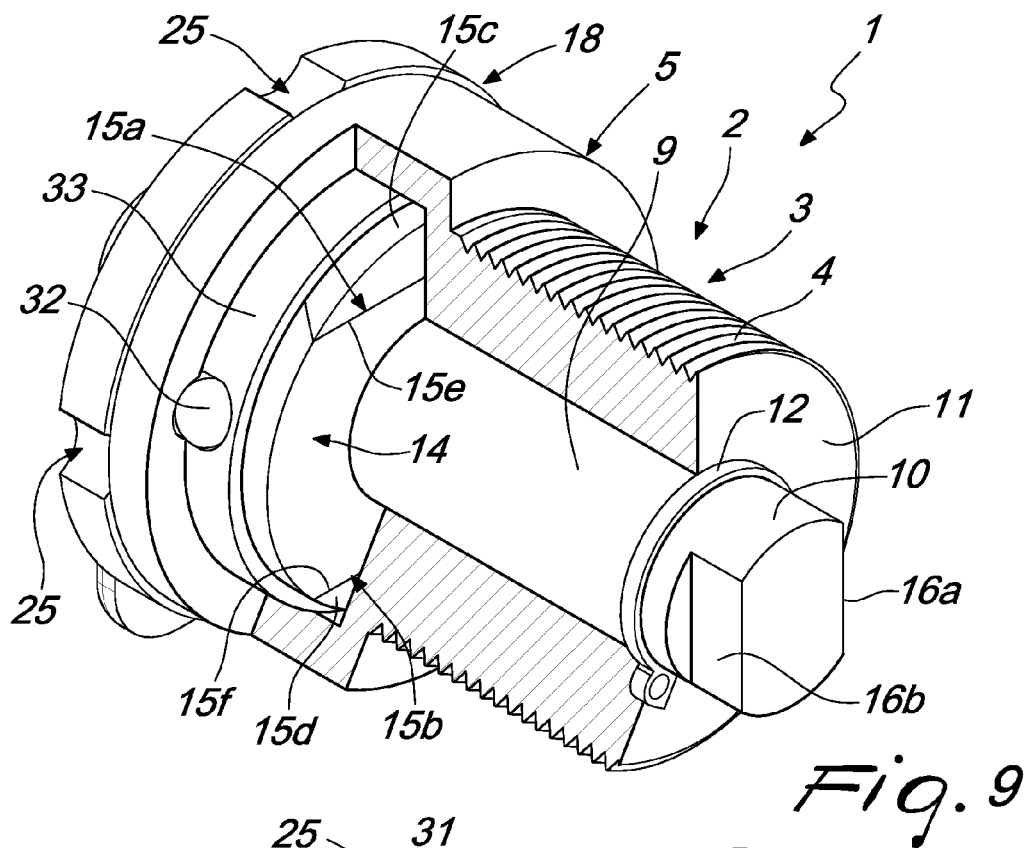


Fig. 6





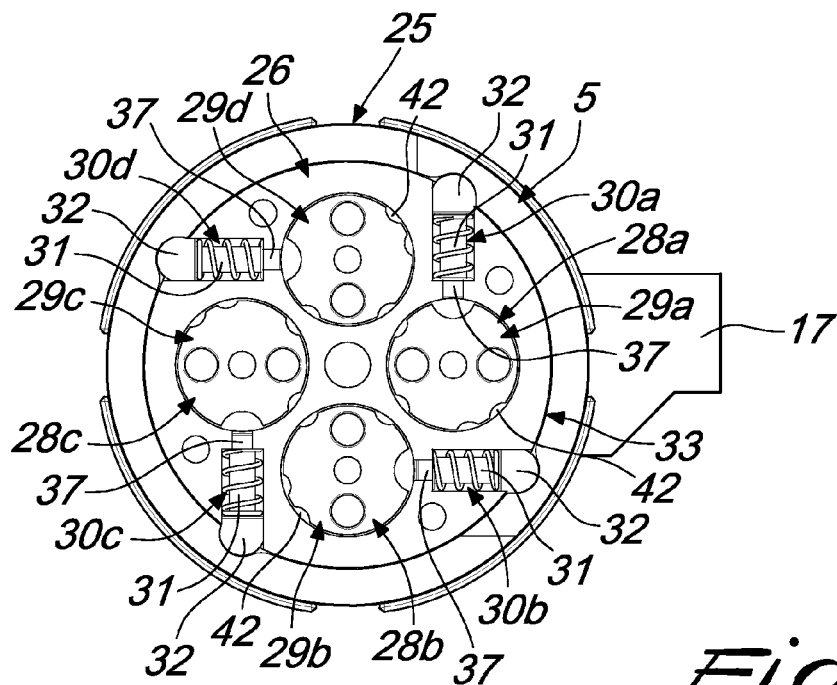


Fig. 11

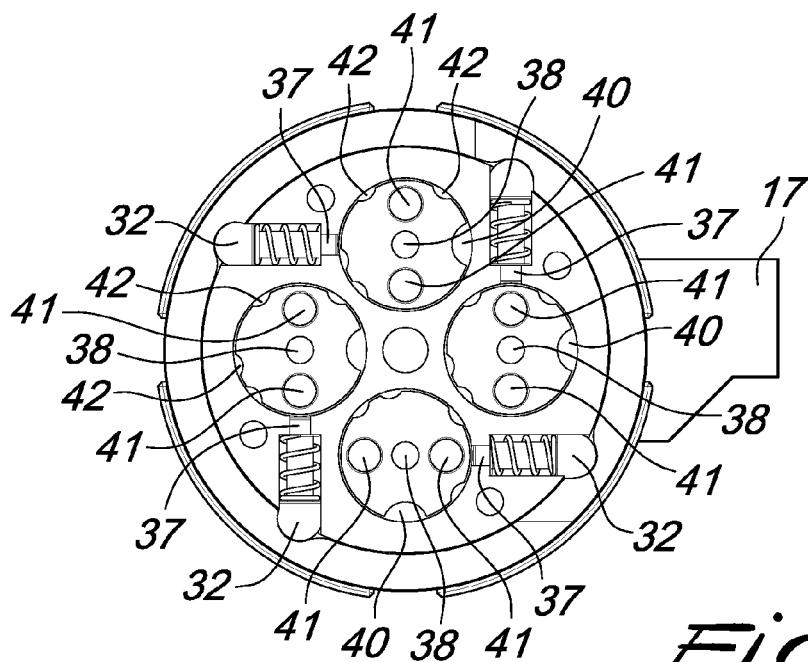
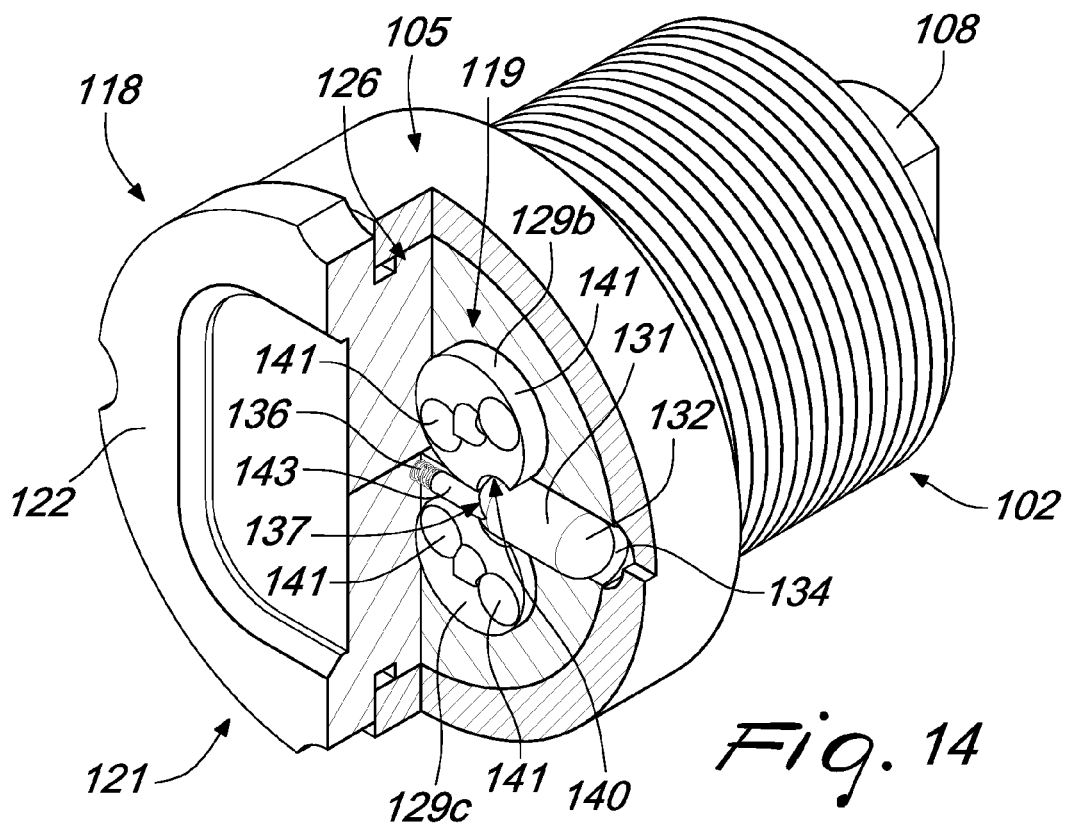
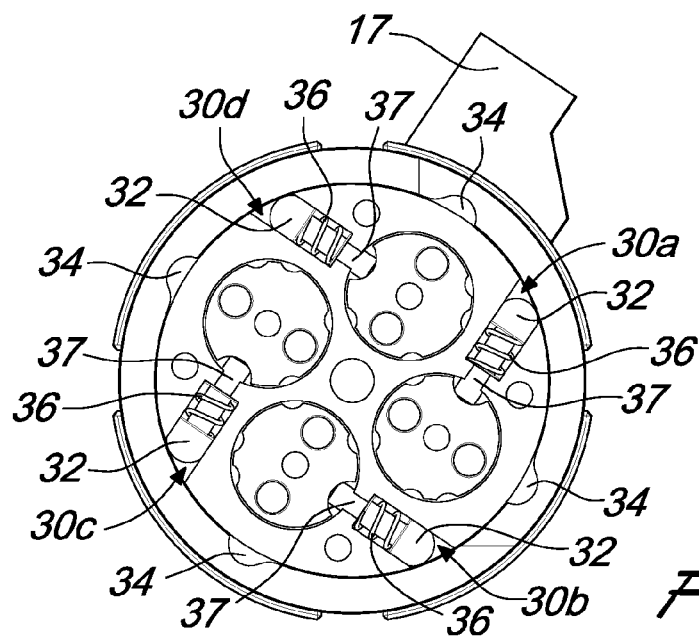
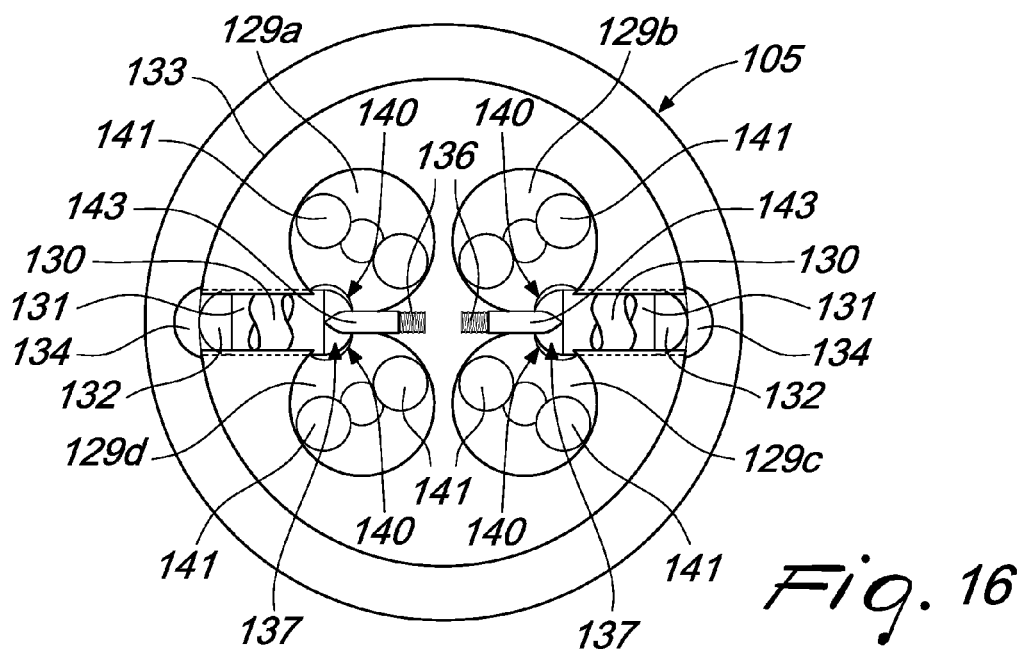
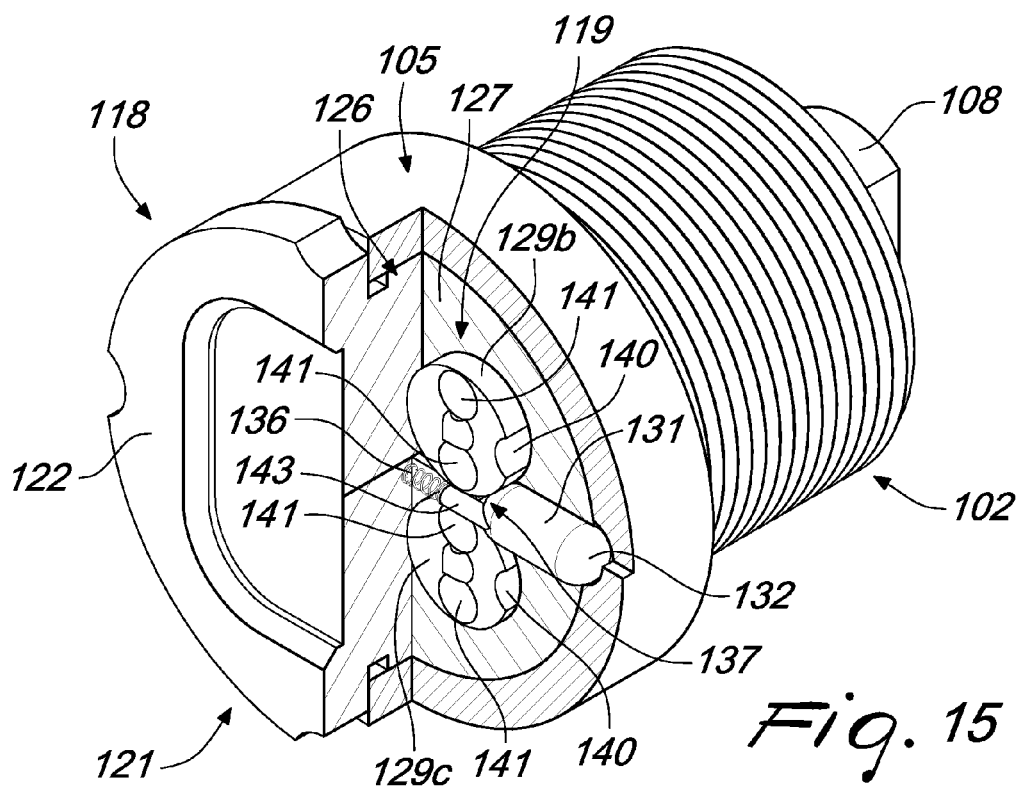


Fig. 12





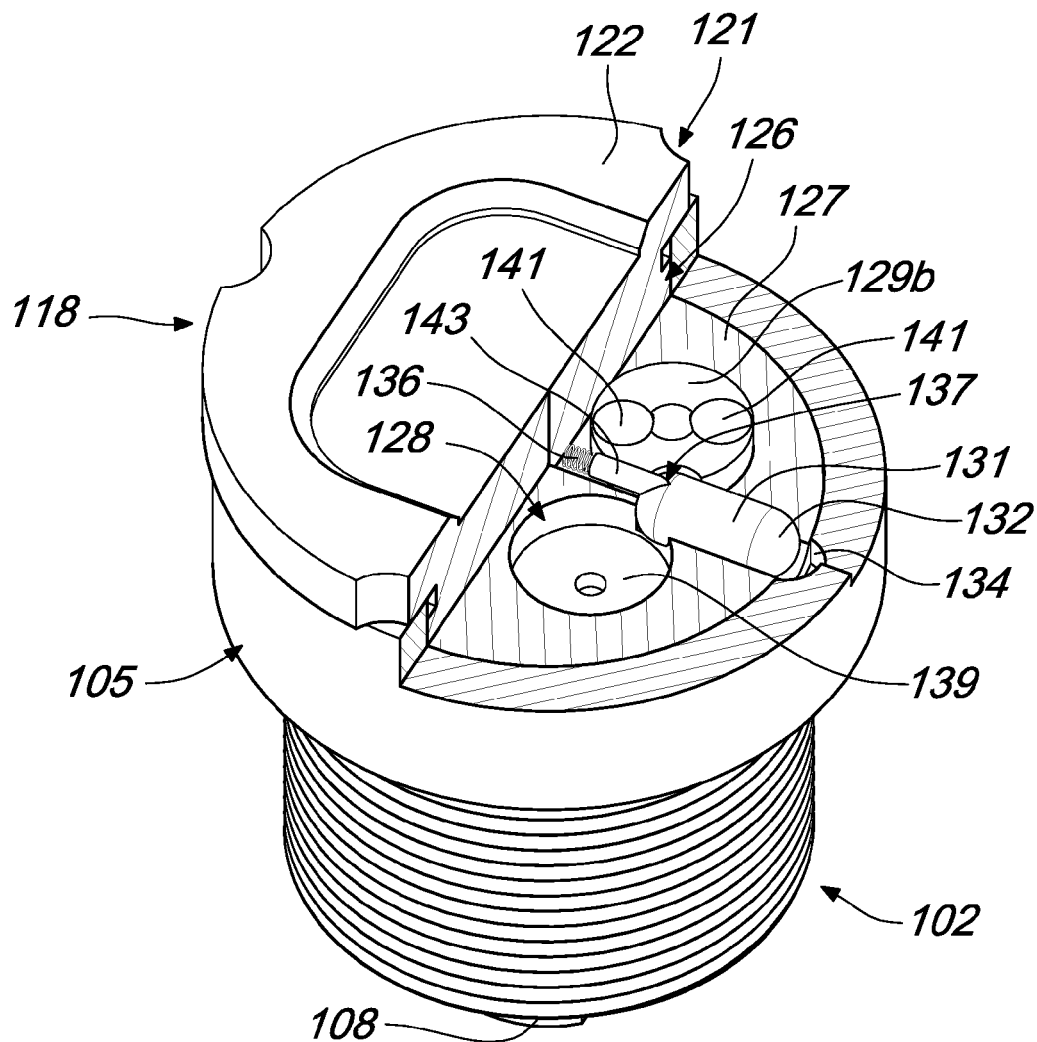


Fig. 17

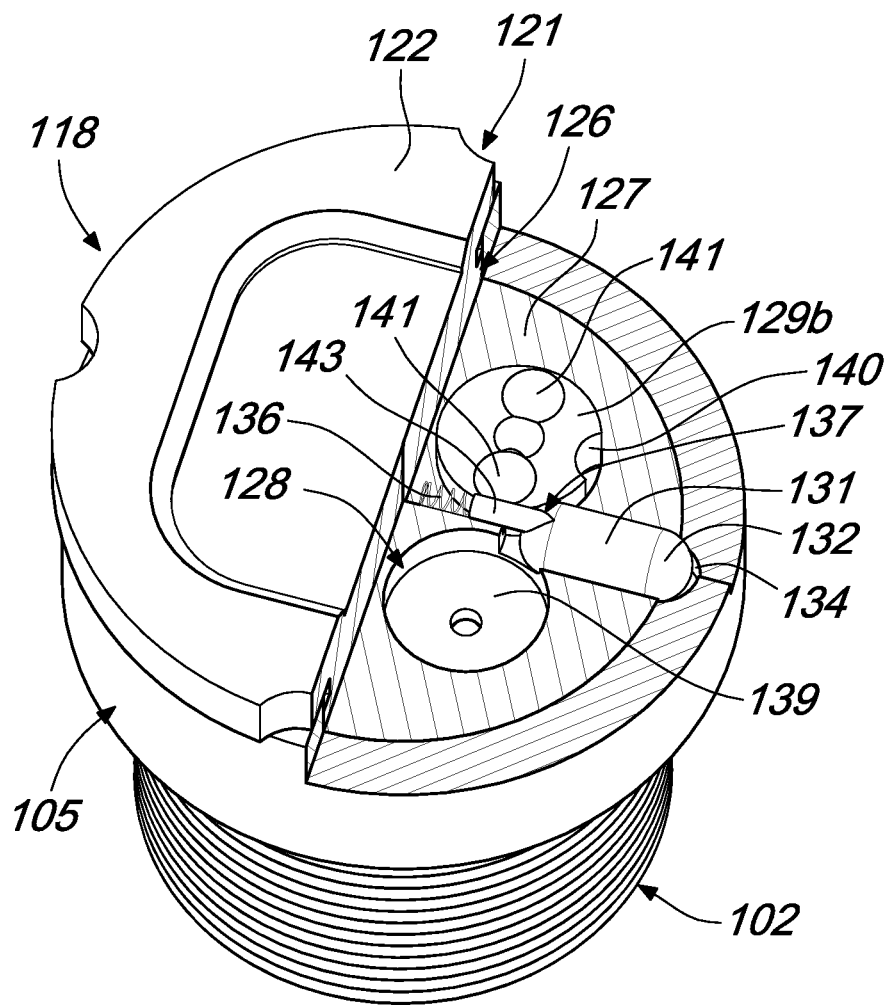


Fig. 18

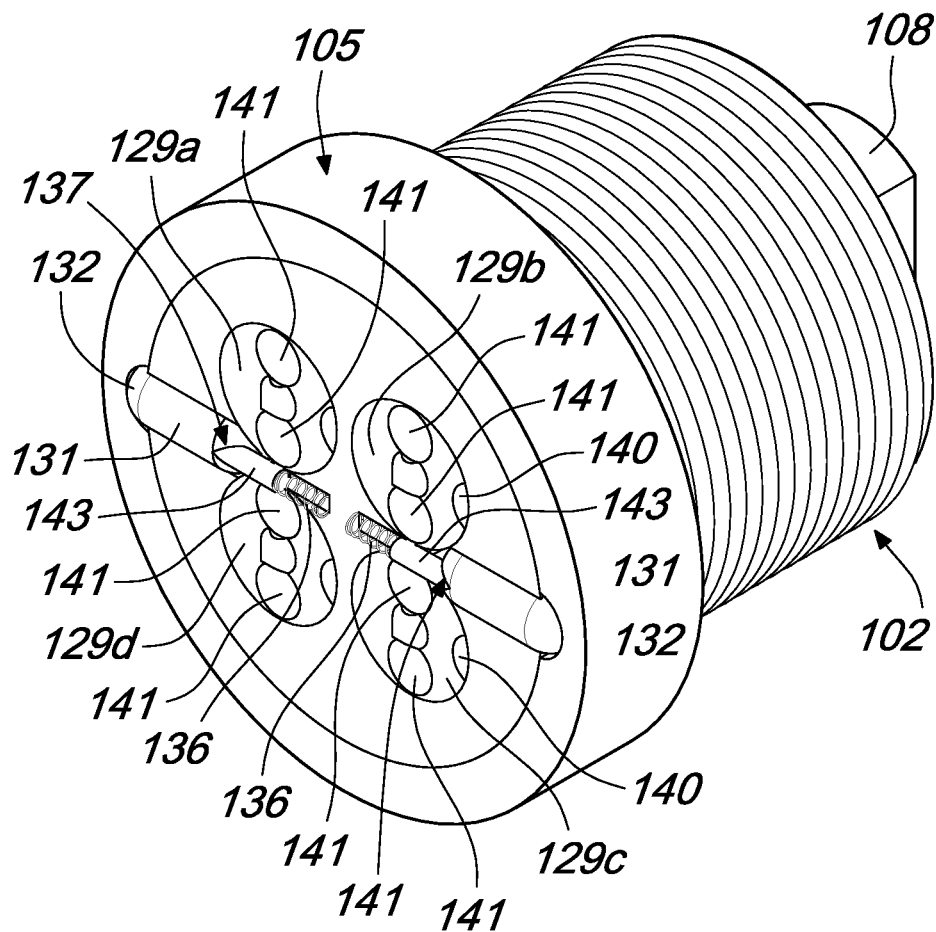


Fig. 19

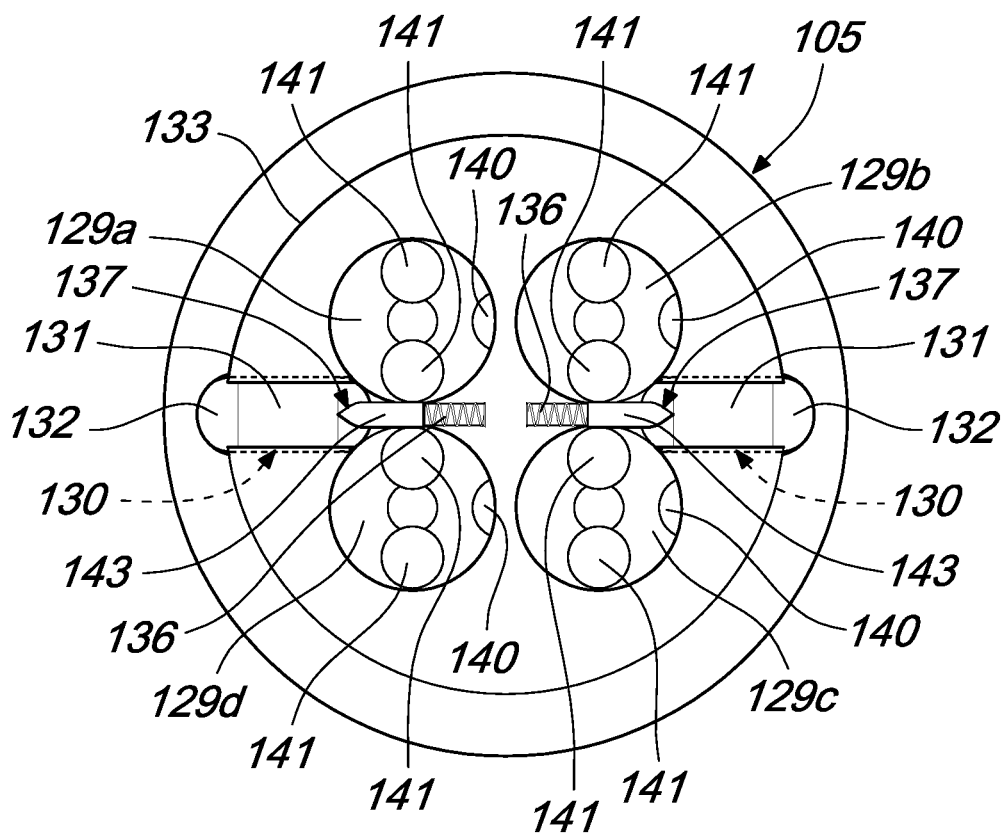


Fig. 20

LOCK FOR A DOOR OR DOOR WING**CROSS-REFERENCE TO RELATED APPLICATION**

This application claims priority under 35 U.S.C. §119(a)-(d) to Italian Patent Application No. TV2013A000018, filed on Feb. 15, 2013, which is hereby incorporated by reference in its entirety for all purposes.

BACKGROUND OF THE INVENTION

The present invention relates to a lock.

Currently, locks, also termed cam locks, are known which are substantially constituted by a cam or plate made of metal, fixed to a pivot, which rotates together with the key; the metal plate usually moves by 90° or 180° and makes it possible to ensure the locking for example of a door; these locks can use cylindrical pin tumblers of different lengths arranged in a circle and moved into position by a tubular key, or are provided with a row of discs with different profiles, which must be aligned by the correct key in order to open the lock, and in this case the key used is of the flat type.

This known type of lock is structurally very simple and therefore is subject to break-ins.

As a partial solution to this drawback, for example, the "Series 35" lock by the British company CAMLOCK SYSTEM Ltd, headquartered in 3 Park View, Compton Industrial Estate, Eastbourne, East Sussex, is known which comprises a cylinder provided with an anti-drill center post to which said lever is keyed and which can be activated by means of an adapted key provided with radial elements that can be inserted in complementary shaped seats or slots provided in a cover that can be screwed onto said cylinder.

These known types of locks have another drawback, which is linked to the great diversity of dimensions of the cylinders that can be used, which makes it necessary to have many items in stock.

SUMMARY OF THE INVENTION

The aim of the present invention is to solve the highlighted technical problems, eliminating the drawbacks of the cited background art, by devising a lock of the cam type that allows the hindering of tampering attempts and has low manufacturing, stocking and transport costs.

Within this aim, an object of the invention is to provide a lock that makes it possible to prevent a burglar from achieving a condition of direct access to the cylinder.

Another object is to provide a lock that is structurally simple and has low manufacturing costs.

This aim and these and other objects that will become more apparent hereinafter are achieved by a lock comprising a cylinder, fixed to a door or door wing, with which a pivot is associated coaxially and rotatably, a lever for closing said door or door wing to a jamb being keyed to the end of said pivot, characterized in that a separate body can be keyed detachably to the head of said pivot and is provided with magnetic means for the temporary locking of the rotation of said body with respect to said cylinder.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the invention will become more apparent from the detailed description of a

particular but not exclusive embodiment, illustrated by way of non-limiting example in the accompanying drawings, wherein:

FIG. 1 is a lateral perspective view of the lock in a first position;

FIG. 2 is a lateral perspective view of the lock in a second position;

FIGS. 3 and 4 are respectively a partially sectional perspective view and a partially exploded view of the lock;

FIGS. 5 and 6 are two exploded views of the lock;

FIGS. 7 and 8 are two views of parts of the partially disassembled invention;

FIGS. 9 and 10 are two partially sectional perspective views of the invention;

FIGS. 11 to 13 are views of the invention that highlight the magnetic means and their interaction with the cylinder;

FIGS. 14, 15, 17 and 18 are first and second lateral perspective views of a further embodiment in the conditions of activation and deactivation of the magnetic means;

FIG. 16 is a front view of the activation condition of the magnetic means; and

FIGS. 19 and 20 are lateral and front perspective views of the deactivation condition of the magnetic means.

In the exemplary embodiments that follow, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other exemplary embodiments.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to the accompanying figures, the reference numeral 1 designates a lock, which comprises a cylinder 2, fixed to a door or door wing (not shown), which has a T-shaped configuration whose first stem 3 has an external thread 4 and whose first head 5 has a cylindrical shape and a first seat 6, axially to which a through hole 7 is provided.

A pivot 8 is arranged rotatably and coaxially in the first seat 6 and at the hole 7, such pivot 8 being T-shaped so as to form a second cylindrical stem 9, which acts rotatably in said hole 7 and which, when installed, protrudes with its end 10 beyond the lower surface 11 of the first stem 3 of the cylinder 2.

The second stem 9 is kept rotatably associated, without the possibility of disconnection, with the cylinder 2 by means of an elastic key 12, which is omega-shaped and can be associated at an annular groove 13 that is provided in said first stem 9 and is adjacent to said end 10.

The pivot 8 has, moreover, a second flat head 14, which acts rotatably within the first seat 6, the second head 14 having, in plain view, a circular shape with two recesses 15a, 15b obtained along two parallel chords.

A lever 17 is keyed to the end 10 of the second stem 9, which has an adapted pair of mutually parallel bevels 16a, 16b and is adapted to allow the closing of said door or door wing to a jamb.

A separate body 18 can be keyed detachably at said second head 14 of said pivot 8 and is provided with magnetic means 19 for the temporary locking of the rotation of said body 18 with respect to said cylinder 2.

The cylinder 2 is fixed to a door or door wing by means of an adapted ring 20 that can be associated rotatably with said external thread 4 of the first stem 3 of said cylinder 2.

The body 18 is constituted by a disc 21 that has, on a front surface 22 that is directed away from the cylinder 2, a second seat 23, which has a preferably square plan shape with rounded corners and within which it is possible to arrange selectively a complementary shaped magnetic key 24 that

contains at least one magnet. Grooves **25** are provided in the perimetric edge of the disc **21** and are adapted to constitute grip means for the user, who can thus impart a desired rotation to the disc **21**.

A third cylindrical stem **26** protrudes on the side that is opposite to the front surface **22** of the disc **21** and has, in its surface **27** directed toward the pivot **8**, in the particular embodiment shown, four circular third seats or cavities **28a**, **28b**, **28c**, **28d** for complementary shaped cams **29a**, **29b**, **29c**, **29d**, that can be associated rotatably therewith.

The body **18** can be associated slidingly and detachably with the second head **14** and has, for this purpose, an adapted pair of protrusions **15c**, **15d**, which are preferably crescent-shaped, protrude so as to be mutually opposite from the surface **27**, and have such dimensions and such an arrangement that they interact slidingly with the recesses **15a**, **15b**, as shown in FIGS. **7** and **8**, so as to achieve temporary interconnection with the second head **14**.

The height of the flat base **15e**, **15f** of the protrusions **15c**, **15d** in fact is substantially equal to the width of the recesses **15a**, **15b**, while the distance between the protrusions **15c**, **15d** is substantially equal to the distance between the recesses **15a**, **15b**.

Advantageously, the coupling occurs by means of a dovetail connection, the surfaces of the recesses **15a**, **15b** and of the protrusions **15c**, **15d** being inclined.

The third seats or cavities are advantageously arranged with the center at the corners of a polygon, constituted, in the particular embodiment, by a square.

As an alternative, the number of the four third seats or cavities may be larger or smaller than four; advantageously, the center of the four third seats or cavities is arranged at a polygon having an equal number of sides; thus, if there are three seats the polygon will be a triangle, if there are five it will be a pentagon, and so forth.

Four through openings **30a**, **30b**, **30c**, **30d** are provided at the third stem **26** along chords that pass through a diameter of each one of said third seats or cavities **28a**, **28b**, **28c**, **28d** and are connected thereto, and are oriented so as to be arranged, in a clockwise sequence, at right angles to each other and in mutually opposite pairs, each one affecting the diameter of the respective third seat or cavity that is distinct from the one of the third stem **26**.

A pin **31** is arrangeable within each one of said through openings **30a**, **30b**, **30c**, **30d** and has advantageously an approximately hemispherical head.

These pins **31** are slightly longer than the depth of the respective through openings **30a**, **30b**, **30c**, **30d** and have the function of locking temporarily, when they protrude with their first end **32** beyond the perimetric edge **33** of the third stem **26**, the rotation of said cylinder **2**, since the first ends are arranged temporarily within adapted fourth seats **34** that are provided axially to the internal lateral surface **35** of the first head **5** of the cylinder **2**.

Each one of the through openings **30a**, **30b**, **30c**, **30d** has an end section, directed away from the cylinder **5**, that is narrow, so as to form a discontinuity that is adapted to act as an abutment for an end of an elastically deformable element, such as a spring **36**, which with the opposite end abuts against the base of the first end **32** of the pins **31**.

The springs **36** force the first end **32** of the pins **31** to protrude from the through openings **30a**, **30b**, **30c**, **30d** in order to allow the first ends **32** to be arranged, when they are in front of them, in fourth seats **34** of the cylinder **2**.

Each one of the pins **31** has, at the end opposite to the first end **32**, a second end **37**, which, in the condition in which the first ends **32** are arranged within the fourth seats **34** of the

cylinder **2**, is completely inserted in one of the through openings **30a**, **30b**, **30c**, **30d**, without therefore protruding from them.

The length of the pins is therefore such that either the first end **32** or the second end **37** protrudes out of the through openings **30a**, **30b**, **30c**, **30d**.

The cams **29a**, **29b**, **29c**, **29d** are kept in position by means of adapted central axes or pivots **38** that protrude from them and are supported by adapted discs **39** that are arranged so as to close the third seats or cavities **28a**, **28b**, **28c**, **28d**, so as to prevent also the exit of the cams from the first seats.

The discs **39** face the adjacent flat surface of the second head **14**.

Each one of the cams **29a**, **29b**, **29c**, **29d** is substantially cylindrical and at least one first hollow **40** is provided, along a generatrix, on their lateral surface, is preferably but not necessarily approximately semicircular in plain view, and is such as to allow the temporary arrangement of the second end **37** and the consequent disengagement of the first ends **32** from the fourth seats **34**.

One or more first magnets **41** are associated axially with each one of the cams **29a**, **29b**, **29c**, **29d**.

Moreover, at least one additional second hollow **42** is provided, along a generatrix, in the lateral surface of each one of the cams **29a**, **29b**, **29c**, **29d** and differs from the first hollow **40** in that it has a semicircular plan shape that has a smaller diameter and is such as not to allow interaction with the second ends **37** and the consequent engagement of the first ends **32** with the fourth seats **34**.

The second recesses **42** thus form false positions for pins **31** in their arrangement at the cams **29a**, **29b**, **29c**, **29d**; this makes listening and therefore picking by a burglar in practice very difficult to achieve, because of the combination of false positions that can be achieved by varying the number of second recesses **42**.

The movement of the pins **31** is allowed thanks to the use of the magnetic key **24**, which is placed into the second seat **23**: the key imposes on the cams **29a**, **29b**, **29c**, **29d** such a rotation as to arrange the first recesses **40** of the cams **29a**, **29b**, **29c**, **29d** in such a position as to face the second ends **37** of the pins **31**, thus allowing the pins to move within the through openings **30a**, **30b**, **30c**, **30d** so as to allow the disengagement of the first ends **32** from the fourth seats **34** of the cylinder **2** upon a rotation imposed thereon.

This rotation of the cylinder is adapted to rotate the lever **17** and therefore allow the opening of the door.

It has thus been found that the invention has achieved the intended aim and objects, a lock of the cam type having been devised which is capable of protecting effectively the lock from tampering attempts.

This solution makes it possible to prevent a burglar from verifying the open condition of the lock simply by listening.

This solution can be easily applied also to ordinary doors of the known type and has the advantage that it is possible to provide cylinders of different dimensions but a single body **18** provided with the magnetic means **19**; in this manner, stock reserves and transport and stocking costs by retailers are reduced.

The possibility of coupling and uncoupling the cylinders to and from a single body to **18** allows in fact quick and easy assembly of the desired type of lock.

Since the coupling between the second head **14** of the stem **9** and the body **18** occurs by means of a dovetail connection, it allows the achievement of two advantages: first of all, even if perfect centering between the third stem **26** of the body **18** and the first axial seat **6** of the cylinder **2** does not occur,

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clearance in the coupling being equal, one avoids interference in the rotation, since the stem 9 can translate.

Secondly, there is an advantage during production, since one has always a same lock in which one can simply change for example the length of the stem 9 and of the cylinder 2.

Obviously, the invention is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

Moreover, the number of the third seats or cavities 28a, 28b, 28c, 28d may be other than four, and likewise the number of the cams and the pins 31 may vary accordingly.

The number of second hollows 42 also may be reduced or even increased so as to increase the number of false positions of the second ends 37, which, if a burglar operates with an external magnet on said cams, will not allow the sliding of the pins and therefore the rotation of the cylinder.

The placement of the cams 29a, 29b, 29c, 29d may also be more pertinent to specific requirements.

Thus, for example, FIGS. 14 to 20 illustrate a further embodiment for magnetic means 119 for the temporary locking of the rotation of the body 118 with respect to the cylinder 102.

In this embodiment, a third cylindrical stem 126 protrudes from the side that is opposite to the front surface 122 of the disc 121 and has, in its surface 127 directed toward the pivot 108, four circular third seats or cavities, designated by the numerals 128, for complementary shaped cams 129a, 129b, 129c, 129d that can be associated rotatably therewith, and for discs 139.

Two through openings 130 are provided in the third stem 126 along an axis that passes through the diameter of said surface 127, each through opening being connected to two pairs of the third seats or cavities 128.

A pin 131 is arrangeable within each one of said through openings 130 and has an approximately hemispherical first end 132 directed toward the first head 105 of the cylinder 102.

Such pins 131 are slightly longer than the depth of the respective through openings 130 and have the function of locking temporarily, when they protrude with their first end 132 beyond the perimetric edge 133 of the third stem 126, the rotation of the cylinder 102, since the first ends 132 are arranged temporarily within adapted fourth seats 134 that are provided axially to the internal lateral surface of the first head 105 of the cylinder 102.

Each one of the through openings 130 has an end section, directed away from said cylinder 105, that is narrower and is extended almost up to the center line of the diameter of the third stem 126 so as to form a seat for an elastically deformable element, such as a spring 136 on which a grub 143 acts which is coupled, at the opposite end, to the second end 137 of the pins 131, which has a bilobate shape.

Such springs 136 force the first end 132 of the pins 131 to exit from the through openings 130 in order to allow the first ends 132 to be arranged, when they are in front of them, in the fourth seats 134 of the cylinder 102.

The second end 137 of each one of the pins 131, in the condition in which the first ends 132 are arranged within the fourth seats 134 of the cylinder 102, is completely inserted in one of the through openings 130, interacting with the smooth outer surface of the cams 129a, 129b, 129c, 129d.

The second ends 137 may interact selectively with at least one first hollow 140, which is provided in the lateral surface along a generatrix of the cams 129a, 129b, 129c, 129d, such hollow 140 having, preferably but not necessarily, an approximately semicircular plan shape and being such as to allow the temporary placement of the second bilobate end 137 simultaneously within two of the hollows 140 of two of the

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cams 129a, 129b, 129c, 129d and the consequent disengagement of the first ends 132 from the fourth seats 134.

Of course, the seats 130 have a convenient length.

One or more first magnets 141 are associated axially with each one of the cams 129a, 129b, 129c, 129d.

In this case also, the movement of the pins 131 is allowed by the use of the magnetic key: the key imposes on the cams 129a, 129b, 129c, 129d such a rotation as to arrange the first recesses 140 of each pair of cams 129a, 129b, 129c, 129d in such a position as to face the second ends 137 of the pins 131, thus allowing the pins to move within the through openings 130 so as to allow the disengagement of said first ends 132 from the fourth seats 134 of the cylinder 102 upon a rotation imposed thereon.

The materials used, as well as the dimensions that constitute the individual components of the invention may of course be more pertinent to the specific requirements.

The various means for performing certain different functions need not certainly coexist only in the illustrated embodiment but can be present per se in many embodiments, including embodiments that are not illustrated.

The characteristics indicated as advantageous, convenient or the like may also be omitted or be replaced with equivalents.

What is claimed is:

1. A lock comprising a cylinder, fixed to a door or door wing, with which a pivot is associated coaxially and rotatably, a lever for closing said door or door wing to a jamb being keyed to the end of said pivot, wherein a separate body can be keyed detachably to a second head of said pivot and is provided with magnetic means for temporary locking of a rotation of said body with respect to said cylinder,

wherein said cylinder has a T-shaped configuration in which a first stem has an external thread and a cylindrical first head has a first seat, axially to which a through hole is provided, said pivot being arrangeable rotatably and coaxially with said first seat and at said through hole, said pivot forming a second cylindrical stem, which acts rotatably in said through hole and which, when installed, protrudes with an end thereof beyond a lower surface of said first stem of said cylinder, said second stem being kept rotatably associated, without the possibility of disconnection, with said cylinder by means of an elastic key, which is omega-shaped and can be associated with an annular groove that is provided in said first stem and is adjacent to said end, said second head of said pivot having a flat head that acts rotatably within said first seat, wherein said second head has a circular shape with two recesses obtained along two parallel chords, the separate body being able to be keyed removably at said second head of said pivot and being provided with said magnetic means for the temporary locking of the rotation of said body with respect to said cylinder, and

wherein said body is constituted by a disc that has, on a front surface that is directed away from said cylinder, a second seat, which has a square plan shape with rounded corners and within which it is possible to arrange selectively a complementarily shaped magnetic key that contains at least one magnet, grooves being provided in a perimetric edge of said disc and being adapted to constitute grip means for a user, a third cylindrical stem protruding from a side that is opposite to the front surface of said disc and having, in a surface of said third cylindrical stem directed toward said pivot, two or more circular third seats or cavities for complementarily shaped cams that can be associated rotatably therewith, and one

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or more first magnets being associated axially with each one of said complementary shaped cams.

2. The lock according to claim 1, wherein said body can be associated slidingly and detachably with said second head and has, a pair of protrusions, which are crescent-shaped, and protrude so as to be mutually opposite from said front surface and have such dimensions and such an arrangement that the protrusions interact slidingly with said recesses so as to achieve temporary interconnection with said second head, a height of a flat base of said protrusions being substantially equal to a width of said recesses, while a mutual distance between said protrusions is substantially equal to a distance between said recesses.

3. The lock according to claim 2, wherein a coupling between said second head and said body occurs by means of a dovetail connection, with surfaces of said recesses and of said protrusions being inclined.

4. The lock according to claim 1, wherein four through openings are provided in said third stem along chords that pass through a diameter of each one of said third seats or cavities and are connected thereto, and are oriented so as to be arranged, in a clockwise sequence, at right angles to each other and in mutually opposite pairs, each one affecting the diameter of the respective third seat or cavity that is distinct from the one of said third stem, a pin being arrangeable within each one of said through openings and having an approximately hemispherical head, said pins being slightly longer than the depth of the respective through openings and having the function of locking temporarily, when they protrude with a first end thereof beyond a perimetric edge of said third stem, the rotation of said cylinder, since said first ends are arranged temporarily within fourth seats that are provided axially to an internal lateral surface of said cylindrical first head.

5. The lock according to claim 4, wherein each one of said through openings has an end section, directed away from said cylinder, that is narrower, so as to form a discontinuity that is adapted to act as an abutment for an end of an elastically deformable element, which at an opposite end abuts against a base of said first end of said pins, said elastically deformable element forcing the first end of said pins to protrude from said through openings in order to allow said first ends to be arranged in fourth seats of said cylinder, each one of said pins having, at an end opposite to said first end, a second end, which, in a condition in which said first ends are arranged within said fourth seats of said cylinder, is completely inserted in one of said through openings a length of said pins being such that either said first end or said second end protrude from said through openings.

6. The lock according to claim 5, wherein said cams are kept in position by means of central axes or pivots that protrude from the cams and are supported by discs that are arranged so as to close said third seats or cavities, so as to prevent also the exit of said cams from said first seats, said discs facing an adjacent flat surface of said second head, each one of said cams being substantially cylindrical and at least one first hollow being provided, along a generatrix, in a lateral surface, being substantially semicircular, and being such as to

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allow a temporary arrangement of said second end and a consequent disengagement of said first ends from said fourth seats.

7. The lock according to claim 6, wherein at least one additional second hollow is provided, along a generatrix, in a lateral surface of each one of said cams and has a semicircular plan shape and is such as not to allow interaction with said second ends and a consequent engagement of said first ends with said fourth seats, second recesses of the cams forming false positions for said pins in their arrangement at said cams.

8. The lock according to claim 7, wherein a movement of said pins is allowed by the use of said magnetic key, which is placed in said second seat, said magnetic key imposing on said cams such a rotation as to arrange said first hollows of said cams in such a position as to face said second ends of said pins, thus allowing said pins to move within said through openings so as to allow the disengagement of said first ends from said fourth seats of said cylinder upon a rotation imposed thereon, the rotation of said cylinder allowing said lever to rotate as well.

9. The lock according to claim 1, wherein said cylinder is fixed to a door or door wing by means of an adapted ring that can be associated rotatably with said external thread of said first stem of said cylinder.

10. The lock according to claim 3, wherein said third seats or cavities are arranged with a center at the corners of a polygon.

11. The lock according to claim 10, further comprising four circular third seats or cavities for complementary shaped cams that can be rotatably associated therewith, two through openings being provided in a third stem along an axis that passes substantially through a diameter of said surface of said third cylindrical stem, each said through opening being connected to two pairs of said third seats or cavities, a pin being arrangeable within each one of said through openings.

12. The lock according to claim 11, wherein each one of said through openings has an end section, directed away from said cylinder, that is narrower and is extended almost up to the center line of the diameter of said third stem so as to form a seat for an elastically deformable element on which a grub acts which is coupled, at the opposite end, to a second end of said pins, which has a bilobate shape, said elastically deformed element forcing said first end of said pins to exit from said through openings to allow said first ends to be arranged, when they are in front of them, in said fourth seats of said cylinder.

13. The lock according to claim 12, wherein said second end, in a condition in which said first ends are arranged within said fourth seats of said cylinder, are completely inserted within one of said through openings, interacting with the smooth outer surface of said cams, said second ends interacting selectively with at least one first hollow, which is provided in the lateral surface along a generatrix of said cams, said hollow having a substantially semicircular plan shape and being such as to allow the temporary placement of said second bilobate end simultaneously within two of said hollows of two of said cams and a consequent disengagement of said first ends from said fourth seats.

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